

Amendments to the Claims

This Listing of Claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A process for controlling operations in a cell for producing aluminum by electrolysis of alumina wherein said cell comprises a chamber containing a molten electrolyte comprising cryolite and alumina, said electrolyte being at least partially covered by a solid crust, said process comprising:

(a) establishing a standard rate of addition of aluminum fluoride to the electrolyte;

(b) sensing infrared radiation on the outer surface of the chamber with an infrared sensor to determine an actual temperature; and

(c) comparing said actual temperature to a target temperature; and

(d) completing a predetermined action when the actual temperature is varies from said target temperature by more than a preselected limit. greater than the target temperature, inspecting the crust for a crust hole and repairing the crust hole.

2. (Original) The process of claim 1 further comprising repeating steps (b) and (c).

3. (Currently Amended) The process of claim 1, wherein said completing a predetermined action step comprises~~comprising~~:

~~(de) varying an actual rate of addition of aluminum fluoride to the electrolyte in response to the actual temperature,~~ in accordance with one of the following steps:

(1) increasing the actual rate of aluminum fluoride addition above the standard rate when the actual temperature is greater than the target temperature; and

(2) reducing the actual rate below the standard rate when the actual temperature is less than the target temperature.;~~or~~

~~(3) adding the aluminum fluoride to the electrolyte at about the standard rate when the actual temperature is about equal to the target temperature.~~

4. (Cancelled)

5. (Cancelled)

6. (Currently Amended) The process of claim 1, wherein said completing a predetermined action step comprises:
inspecting the crust for crust holes; and
repairing any of said crust holes, wherein said repairing step comprises covering said crust holes with solid particles.

7. (Original) The process of claim 1 further comprising passing an electric current between an anode and a cathode in said cell thereby to produce aluminum.

8. (Currently Amended) The process of claim 4, wherein said repairing any of said crust holes step comprises covering any of said crust holes ~~it~~ with a receptacle containing solid particles selected from the group consisting of alumina, aluminum fluoride, cryolite, and mixture thereof.

9. (Currently Amended) A process for controlling operations in a plurality of electrolytic cells, each of said plurality of cells comprising a chamber containing a molten electrolyte comprising cryolite and alumina, said electrolyte being at least partially covered by a solid crust, the process comprising as described in claim 1, comprising:

(a) establishing a standard rate of addition of aluminum fluoride to an electrolyte for each of the plurality of electrolytic cells;

(b) sensing infrared radiation on the outer surface of the chamber of each of the plurality of electrolytic cells;

(c) transmitting a thermal image from the infrared sensor to a data processor for each of the plurality of electrolytic cells

(d) estimating the actual temperature of the outer surface of the chamber of each the plurality of electrolytic cells based on the thermal image of each of the plurality of electrolytic cells; and

(e) completing a predetermined action when any one of the actual temperatures varies from a corresponding one of said target temperatures by more than a preselected limit.

(d) performing steps (a), (b), and (c) in each of the cells;

(e) transmitting a thermal image from the infrared sensor to a data processor to estimate the actual temperature of the outer surface of the chamber of each cell; and

(f) performing step (d) on any of the cells in which the actual temperature deviates from the target temperature by more than a preselected limit.

10. (Original) The process of claim 9 further comprising passing an electric current between an anode and a cathode in each said cells, thereby to produce aluminum in each said cells.

11. (Original) A process for controlling operations in a cell for producing aluminum by electrolysis of alumina wherein said cell comprises a chamber containing a molten electrolyte comprising cryolite and alumina, said electrolyte being at least partially covered by a solid crust, said process comprising:

(a) establishing a standard rate of addition of aluminum fluoride to the electrolyte;

(b) establishing a target temperature for an outer surface of the chamber;

(c) sensing infrared radiation on the outer surface of the chamber with an infrared sensor to determine an actual temperature; and

(d) varying an actual rate of addition of aluminum fluoride to the electrolyte in response to the actual temperature measured in step (c), by increasing the actual rate of aluminum fluoride addition above the standard rate when the actual temperature is greater than the target temperature and by reducing the actual rate below the standard rate when the actual temperature is less than the target temperature.

12. (Original) The process of claim 11 comprising adding said aluminum fluoride to said electrolyte at about said standard rate when said actual temperature is about equal to said target temperature.

13. (Original) The process of claim 11 further comprising passing an electric current between our anode and a cathode in said cell, thereby to produce aluminum.

14. (New) The process of Claim 1, further comprising:

(e) adding aluminum fluoride to the electrolyte at about a standard addition rate when the actual temperature is about equal to the target temperature.

15. (New) The process of Claim 1, wherein said comparing step comprises: transmitting a thermal image of the chamber from the infrared sensor to a data processor; and

estimating the actual temperature of the outer surface of the chamber based on said thermal image.

16. (New) The process of Claim 9, wherein said completing a predetermined action step comprises one of the following:

(1) increasing the actual rate of aluminum fluoride addition above the standard rate when the actual temperature is greater than a target temperature; and

(2) reducing the actual rate below the standard rate when the actual temperature is less than a target temperature.

17. (New) The process of Claim 9, wherein said completing a predetermined action step comprises:

inspecting for crust holes the crust of any of the electrolytic cells for which an actual temperature measurement varies by more than a preselected limit from the corresponding target temperature; and

repairing any of said crust holes.

18. (New) The process of Claim 16, wherein said repairing step comprises:
covering said crust holes with solid particles.

19. (New) The process of Claim 16, wherein said repairing step comprises:
covering any of said crust holes with a receptacle containing solid particles selected
from the group consisting of alumina, aluminum fluoride, cryolite, and mixture thereof.

20. (New) The process of Claim 9, further comprising:
(f) adding aluminum fluoride to the electrolyte at about a standard addition rate for
each of the plurality of electrolytic cells that have an actual temperature that is about equal to
a corresponding target temperature.